

Air Quality Monitoring Results for the Fort Saskatchewan Area August 26 to September 3, 2001

Alberta Environment monitored air quality in the vicinity of the fire at the BP Canada fractionation plant northeast of Fort Saskatchewan using the Mobile Air Monitoring Laboratory (MAML). Several permanent stations operated by Alberta Environment, industry and Environment Canada in the Fort Saskatchewan area also conduct routine air quality monitoring. In addition, BP Canada deployed mobile monitoring units in the vicinity of the fire.

Air quality parameters measured in the Fort Saskatchewan area included hydrocarbons, particulates, oxides of nitrogen, carbon monoxide, ozone, sulphur dioxide, hydrogen sulphide, total reduced sulphur and ammonia. Hydrocarbons and particulates are the most important pollutants that are potentially emitted by the fire at the fractionation plant.

The Alberta Environment MAML monitored air quality at 25 locations in vicinity of the fire from August 27 to September 3. A summary of data collected by the MAML is indicated in Table 1. Maximum one-hour air quality parameter levels at other monitoring stations in the area are summarized in Table 2. The locations monitored are indicated in Figure 1 and wind directions from August 26 to September 3 are contained in Figures 2 to 6. The following are the major results for this monitoring period.

- ▶ Maximum air quality levels in the Fort Saskatchewan area were well below Alberta's ambient air quality guidelines. Alberta has one-hour guidelines for sulphur dioxide, hydrogen sulphide, nitrogen dioxide, ozone, carbon monoxide and ammonia. Maximum one-hour average concentrations of these chemicals in the Fort Saskatchewan area were:
 - 16% of the one-hour guideline for sulphur dioxide;
 - 40% of the one-hour guideline for hydrogen sulphide;
 - 18% of the one-hour guideline for nitrogen dioxide;
 - 71% of the one-hour guideline for ozone;
 - 8% of the one-hour guideline for carbon monoxide; and
 - 10% of the one-hour guideline for ammonia.
- ▶ Ambient pollutant concentrations in the Fort Saskatchewan area were near normal levels most of the time at all locations from August 26 to September 3. Total hydrocarbon (THC) concentrations at most locations were from 2 to 3 parts per million (ppm). Normal background THC levels are usually around 2 ppm. However, an elevated THC concentration of 10 ppm was measured between 7 and 8 p.m. on August 27 at a Dow Chemical air monitoring station located about 2 km to the south of the BP Canada fractionation plant. Winds were from the north-northwest at 8 km/hr during this time period. The source of this elevated value may have been the fire at the fractionation plant. The THC concentration was from 2 to 2.5 ppm at the Alberta Environment monitoring station in Fort Saskatchewan during the evening of August 27.
- ▶ Fine particulate levels ($PM_{2.5}$) in the Fort Saskatchewan area were low during this monitoring period. The maximum one-hour $PM_{2.5}$ concentration was 26 micrograms per cubic metre ($\mu g/m^3$). The 24-hour Canada-wide Standard benchmark for $PM_{2.5}$ is $30 \mu g/m^3$. Elevated levels of large particulates were measured at several locations by the MAML. These particulates were caused by road dust from vehicles passing by the MAML. Elevated particulate levels were not related to the fractionation plant fire.

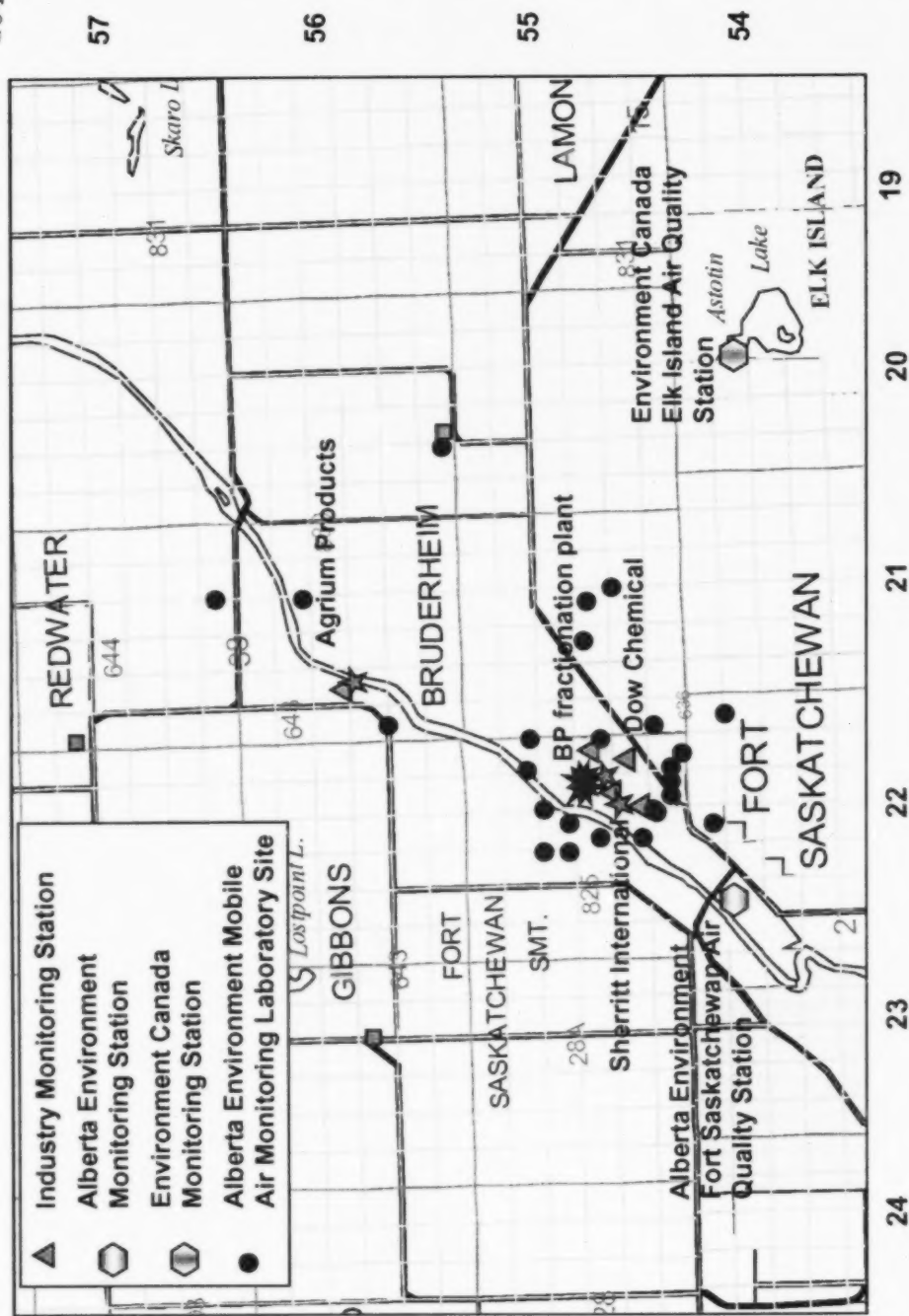


Figure 1: Air Quality Monitoring Sites in the Fort Saskatchewan Area

Table 1: One-Hour Air Quality Parameter Concentrations from the Alberta Environment MAML

Sites#	Date	Start/End Times	CO	O ₃	THC	CH ₄	RHC	SO ₂	NO	NO ₂	NO _x	NH ₃	TRS	H ₂ S	TSP*	PM ₁₀ *	PM _{2.5}	Temp	RH	WSP	WDR	PAH
one-hour guideline			PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	µg/m ³	µg/m ³	µg/m ³	DegC	%RH	KPH	DEG	ng/m ³
overall maximum concentration			13.0	0.082	na	na	na	0.172	na	0.212	na	2.0	na	0.010	na	na	na	na	na	na	na	na
1	27-Aug	11:01 to 12:04	1.0	0.1	3.0	2.7	0.6	0.009	0.012	0.025	0.036	0.015	0.003	0.004	319	203	26	31.7	100	22.8	334	14.6
2	27-Aug	12:20 to 13:25	0.6	0.043	2.2	1.8	0.3	0.002	0.008	0.007	0.012	0.001	0.002	0.001	101	61	6	30.4	26.1	7.5	309	1.8
3	27-Aug	14:10 to 15:11	0.4	0.048	2.2	1.9	0.3	0.003	0.003	0.006	0.008	0.001	0.002	0.001	154	90	9	28.6	28.3	9.5	108	1.0
4	27-Aug	16:21 to 17:30	0.1	0.039	2.3	2.0	0.6	0.003	0.001	0.005	0.006	0.001	0.003	0.001	319	203	21	31.7	23.3	9.0	131	3.3
5	27-Aug	17:51 to 18:56	0.3	0.022	2.1	1.9	0.2	0.002	0.002	0.009	0.009	0.002	0.002	0.000	91	60	7	28.5	28.5	9.8	166	1.5
6	27-Aug	20:05 to 21:37	0.8	0.004	2.7	2.5	0.3	0.001	0.008	0.009	0.018	0.001	0.001	0.000	no data **	no data **	no data **	14.3	84.3	3.2	216	0.7
7	27-Aug	22:22 to 23:40	1.0	0.012	2.5	2.3	0.2	0.002	0.012	0.007	0.018	0.001	0.001	0.004	134	94	14	15.5	82.3	5.5	244	1.2
8	28-Aug	00:00 to 01:10	0.2	0.019	2.2	2.0	0.2	0.001	0.001	0.004	0.005	0.014	0.000	0.000	52	39	7	18.1	67.8	12.8	334	2.7
9	28-Aug	01:51 to 02:59	0.2	0.021	2.1	2.0	0.1	0.000	0.000	0.002	0.002	0.005	0.000	0.000	43	25	3	17.5	67.8	22.5	298	0.9
10	28-Aug	03:12 to 04:28	0.2	0.018	2.0	1.9	0.1	0.000	0.000	0.001	0.002	0.004	0.000	0.000	18	12	3	15.0	85.3	21.2	323	2.2
11	28-Aug	04:41 to 05:49	0.2	0.018	2.0	1.9	0.1	0.000	0.000	0.001	0.002	0.004	0.000	0.000	118	73	7	15.7	63.5	2.3	191	8.0
12	29-Aug	20:11 to 21:16	0.3	0.011	2.8	2.6	0.3	0.000	0.011	0.013	0.023	0.001	0.000	0.000	118	73	7	15.7	63.5	2.3	191	8.0
13	29-Aug	22:49 to 23:51	0.1	0.004	2.6	2.5	0.1	0.000	0.000	0.005	0.005	0.000	0.000	0.000	156	126	26	9.2	93.1	2.4	281	1.1
14	30-Aug	00:19 to 01:30	0.1	0.002	2.3	2.4	0.1	0.000	0.002	0.005	0.006	0.000	0.000	0.000	31	24	5	7.3	88.5	1.4	230	1.4
15	30-Aug	01:48 to 02:57	0.1	0.002	2.6	2.6	0.1	0.000	0.005	0.008	0.012	0.000	0.000	0.000	26	19	4	6.8	100.0	4.1	23	1.6
16	30-Aug	03:34 to 04:36	0.2	0.002	3.0	2.7	0.3	0.000	0.004	0.005	0.008	0.003	0.000	0.000	120	85	11	5.8	100.0	2.3	314	2.6
17	30-Aug	05:07 to 06:07	0.2	0.001	2.8	2.6	0.2	0.000	0.008	0.007	0.014	0.000	0.000	0.000	48	39	9	4.5	100.0	2.9	297	3.5
18	30-Aug	08:57 to 09:57	0.3	0.026	2.2	2.0	0.1	0.003	0.002	0.002	0.003	0.002	0.000	0.000	128	74	6	20.3	47.2	11.7	168	6.6
19	30-Aug	09:57 to 10:57	0.4	0.030	2.2	2.0	0.1	0.001	0.001	0.001	0.002	0.000	0.000	0.000	68	40	4	21.4	42.8	13.5	150	4.3
20	30-Aug	10:57 to 11:57	0.1	0.032	2.2	2.1	0.1	0.000	0.000	0.002	0.003	0.000	0.000	0.000	96	61	6	21.9	42.3	14.3	137	2.6
21	30-Aug	14:00 to 15:00	0.2	0.029	2.1	1.9	0.2	0.001	0.002	0.004	0.006	0.000	0.001	0.000	99	56	6	24.0	34.7	22.7	168	8.6
22	30-Aug	15:00 to 16:00	0.2	0.034	2.1	2.0	0.2	0.000	0.002	0.006	0.008	0.000	0.001	0.000	105	60	6	24.5	33.9	21.5	166	12.6
23	30-Aug	16:00 to 17:00	0.3	0.034	2.2	2.0	0.2	0.000	0.002	0.006	0.008	0.000	0.001	0.000	96	56	6	24.2	35.0	22.8	158	14.6
24	30-Aug	18:30 to 19:30	0.3	0.0	2.5	2.2	0.3	0.0	0.011	0.014	0.027	0.000	0.000	0.000	271	163	17	22	41.5	7.2	250	7
25	31-Aug	09:30 to 10:30	0.3	0.0	2.4	2.1	0.3	0.0	0.010	0.020	0.032	0.001	0.000	0.000	234	143	15	23	41.5	6.9	224	6
26	31-Aug	11:30 to 12:30	0.4	0.0	2.3	2.1	0.2	0.0	0.010	0.025	0.036	0.000	0.000	0.000	226	148	17	21	50.5	14.6	249	6
27	31-Aug	12:39 to 13:39	0.3	0.0	2.4	2.2	0.2	0.0	0.001	0.014	0.016	0.000	0.000	0.000	193	129	17	20	67.4	8.4	257	5
28	31-Aug	13:39 to 14:39	0.3	0.0	2.4	2.2	0.2	0.0	0.000	0.008	0.009	0.000	0.000	0.000	195	123	16	17	92.1	4.3	152	5
29	31-Aug	14:20 to 15:20	0.2	0.0	2.3	2.2	0.1	0.0	0.000	0.007	0.008	0.000	0.000	0.000	no data	no data	no data	17	87.9	8.4	292	2
9	31-Aug	15:42 to 16:42	0.2	0.0	2.2	2.1	0.1	0.0	0.002	0.004	0.005	0.001	0.000	0.000	56	43	7	20	67.7	16.5	326	2
20	01-Sep	08:53 to 09:58	0.1	0.033	1.9	1.8	0.1	0.000	0.001	0.000	0.002	0.000	0.000	0.000	64	36	4	19.4	61.1	13.8	171	0.8
17	01-Sep	10:09 to 11:15	0.1	0.036	1.9	1.8	0.1	0.001	0.002	0.003	0.006	0.000	0.000	0.000	35	22	2	22.5	45.0	19.5	170	0.4
21	01-Sep	11:26 to 12:30	0.1	0.047	1.8	1.7	0.1	0.001	0.000	0.000	0.001	0.000	0.000	0.000	42	27	3	24.8	39.1	11.3	205	0.3
13	01-Sep	12:41 to 13:48	0.1	0.060	1.9	1.8	0.2	0.000	0.001	0.001	0.003	0.000	0.000	0.000	57	36	4	24.5	38.5	15.0	259	1.2
15	01-Sep	14:17 to 15:25	0.1	0.040	1.9	1.8	0.1	0.001	0.000	0.000	0.000	0.000	0.000	0.000	38	24	3	22.7	39.2	21.6	327	0.9
6	01-Sep	15:32 to 16:44	0.1	0.028	2.0	2.0	0.1	0.001	0.003	0.003	0.007	0.000	0.000	0.000	32	20	2	20.5	47.6	16.4	298	2.6
14	01-Sep	16:55 to 18:02	0.1	0.028	2.1	2.0	0.1	0.001	0.001	0.004	0.006	0.000	0.000	0.000	124	25	7	12.2	97.3	7.8	166	0.6
12	02-Sep	08:55 to 10:08	0.5	0.016	2.2	2.1	0.2	0.000	0.012	0.006	0.016	0.000	0.000	0.000	26	16	2	13.5	62.9	no data	no data	8.2
22	02-Sep	10:42 to 11:53	0.3	0.029	2.1	2.1	0.0	0.001	0.003	0.002	0.004	0.000	0.000	0.000	17	9	1	18.5	31.8	no data	no data	0.3
23	02-Sep	12:15 to 13:21	0.3	0.030	2.0	2.1	0.0	0.001	0.002	0.001	0.002	0.000	0.000	0.000	10	6	1	19.8	29.7	no data	no data	0.2
24	02-Sep	13:33 to 14:37	0.2	0.031	2.0	1.9	0.0	0.001	0.002	0.001	0.003	0.003	0.000	0.000	7	4	0	20.6	27.2	no data	no data	0.2
25	02-Sep	14:47 to 15:34	0.3	0.029	2.0	1.9	0.1	0.001	0.006	0.004	0.009	0.001	0.000	0.000	5	3	0	21.8	27.4	no data	no data	0.9
18	03-Sep	09:19 to 10:21	0.2	0.015	2.2	2.2	0.1	0.004	0.004	0.007	0.011	0.014	0.000	0.000	44	29	4	13.8	58.1	no data	no data	1.4
16	03-Sep	10:33 to 11:34	0.3	0.013	2.3	2.2	0.1	0.006	0.007	0.010	0.016	0.015	0.000	0.000	54	35	5	14.5	58.3	no data	no data	2.3
14	03-Sep	12:07 to 13:07	0.3	0.015	2.4	2.2	0.2	0.003	0.011	0.012	0.023	0.006	0.000	0.000	43	29	4	18.0	46.4	no data	no data	3.7
14	03-Sep	13:07 to 14:07	0.2	0.029	2.2	2.1	0.1	0.002	0.005	0.004	0.009	0.012	0.000	0.000	40	25	3	22.8	35.3	no data	no data	1.1
14	03-Sep	14:07 to 14:45	0.1	0.037	2.0	1.9	0.1	0.001	0.002	0.002	0.004	0.013	0.000	0.000	35	20	2	25.0	28.8	no data	no data	0.5
15	03-Sep	14:48 to 15:50	0.1	0.035	2.0	2.0	0.1	0.000	0.001	0.000	0.001	0.007	0.000	0.000	74	39	3	22.4	33.0	no data	no data	0.2

* - elevated particulate concentrations are due to road dust from traffic passing the MAML.

** - no data is available due to interference from MAML generator exhaust.

na - indicates no one-hour guideline.

Monitoring Site Description

Site #1 100 Ave near Ross Creek bridge (approx. 110 St.)
 Site #2 Ft. Saskatchewan Tennis Club on River Road
 Site #3 Hwy #643 and Rge Rd 220 (2km west of Agrium Redwater)
 Site #4 1km west of Hwy #830 on Twp Rd 552
 Site #5 1km east of Hwy #830 on Twp Rd 552
 Site #6 Hwy #638 1km east of Hwy #15
 Site #7 Rge Rd 221 1km north of Twp Rd 544
 Site #8 Hwy #830 & Twp Rd 553
 Site #9 Rge Rd 221 & Hwy #15 (Dow east gate turnoff)

Monitoring Site Description

Site #10 Rge Rd 221 500m north of Hwy #15 (Dow east gate)
 Site #11 Rge Rd 220 1.6 km north of Twp Rd 550
 Site #12 In Fort Saskatchewan 111 St. and 86 Ave
 Site #13 Rge Rd 222 and Twp Rd 553 (across the river)
 Site #14 Rge Rd 220 and Twp Rd 554
 Site #15 Rge Rd 220 1km north of Hwy #15
 Site #16 Rge Rd 221 and Township Rd 555
 Site #17 Rge Rd 223 500m north of Twp Rd 553 (Riverside Park)

Monitoring Site Description

Site #18 Rge Rd 222 500m south of Township Rd 554 (across the river)
 Site #19 Bruderheim (west side of town)
 Site #20 Ft. Augustus Park (SW15-55-22 W4M)
 Site #21 Hultaven acreages (NE21-55-22 W4M)
 Site #22 Rge Rd 212 and Twp Rd 554
 Site #23 Rge Rd 212 500m north of Twp Rd 550
 Site #24 Rge Rd 212 and Twp Rd 552
 Site #25 Rge Rd 220 and Twp Rd 552

Monitoring Station	Start and End Date and Time	CO PPM	O ₃ PPM	THC PPM	NMHC PPM	SO ₂ PPM	NO PPM	NO ₂ PPM	NO _x PPM	PM _{2.5} µg/m ³	COH Unit ^a	NH ₃ PPM	H ₂ S PPM
one-hour guideline													
Alberta Environment - Fort Saskatchewan	1 a.m. Aug 26 to midnight Sep 3	13.0	0.082	na	na	0.172	na	0.212	na		95% of values < 0.5	2.0	0.010
Sherritt International #1	1 a.m. Aug 28 to midnight Sep 3	0.8	0.058	3.1		0.016	0.072	0.038	0.089			no data	
Sherritt International #3	1 a.m. Aug 28 to midnight Sep 3					0.010		0.030				no data	
Dow Chemical #1	10 a.m. Aug 26 to midnight Sep 3			10.4	0		0.042	0.037	0.057				
Dow Chemical #2	10 a.m. Aug 26 to midnight Sep 3			2.4	0	0.014	0.033	0.033	0.048				
Agrium Redwater	1 a.m. Aug 27 to midnight Sep 3					0.027	0.079	0.028	0.104			0.204	
BP Mobile #1	5 p.m. Aug 27 to 10 a.m. Aug 29				0	0.000							0.000
BP Mobile #2	6 p.m. Aug 27 to 10 a.m. Aug 29				0	0.000							0.000
Environment Canada - Elk Island	1 a.m. Aug 26 to 2 p.m. Aug 28									10.9			

na - indicates no one-hour guideline.

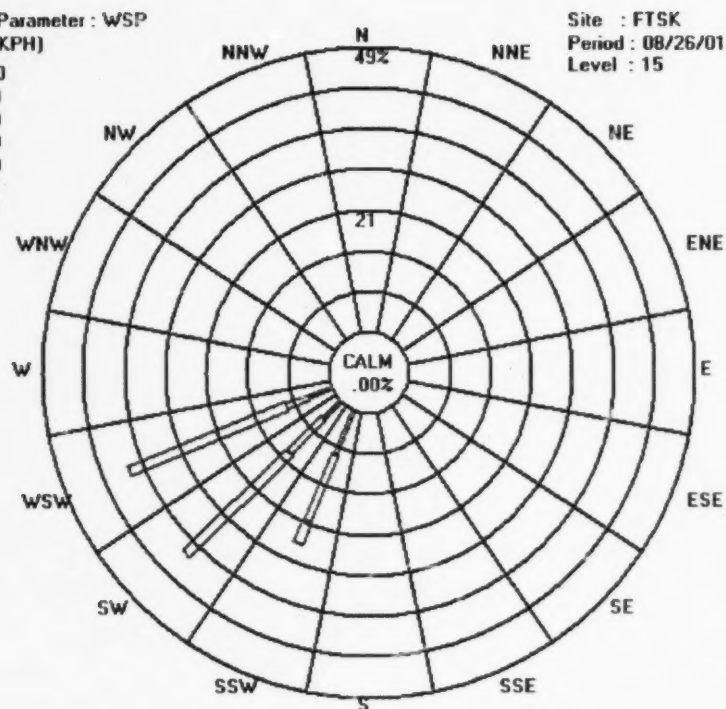
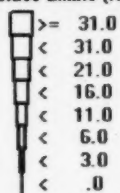
shaded cells - indicates that parameter is not monitored at this station.

no data - indicates that data is not available for this parameter.

List of Air Quality Parameters

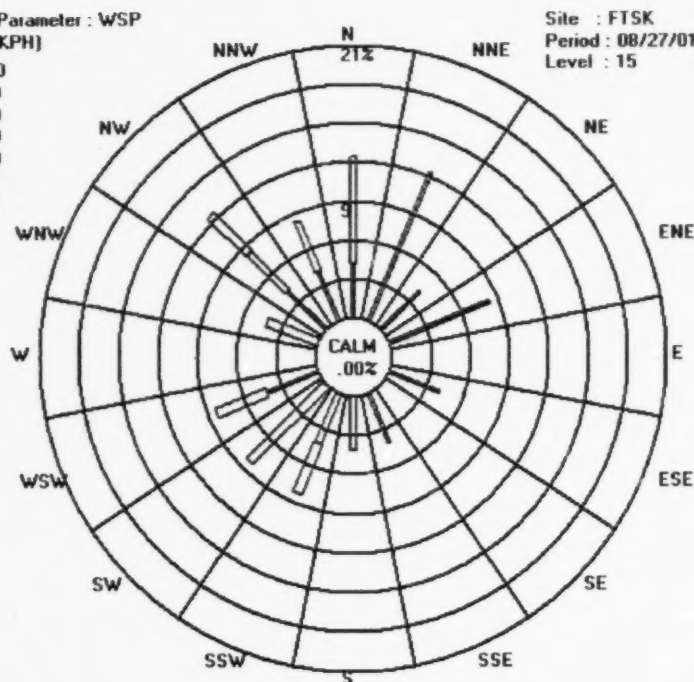
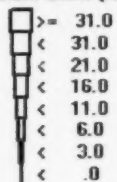
CO - carbon monoxide	NO ₂ - nitrogen dioxide	PAH - polycyclic aromatic hydrocarbons
O ₃ - ozone	NO _x - total oxides of nitrogen	PM ₁₀ - inhalable particulates
THC - total hydrocarbons	NH ₃ - ammonia	PM _{2.5} - respirable particulates
RHC - reactive hydrocarbons	TRS - total reduced sulphur	Temp - temperature
SO ₂ - sulphur dioxide	H ₂ S - hydrogen sulphide	RH - relative humidity
NO - nitric oxide	TSP - total suspended particulates	WSP - wind speed
COH - dust and smoke	NMHC - non-methane hydrocarbons	WDR - wind direction

Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FTSK
Period : 08/26/01-08/26/01
Level : 15

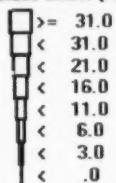
Logger : 14 Parameter : WSP
Class Limits (KPH)



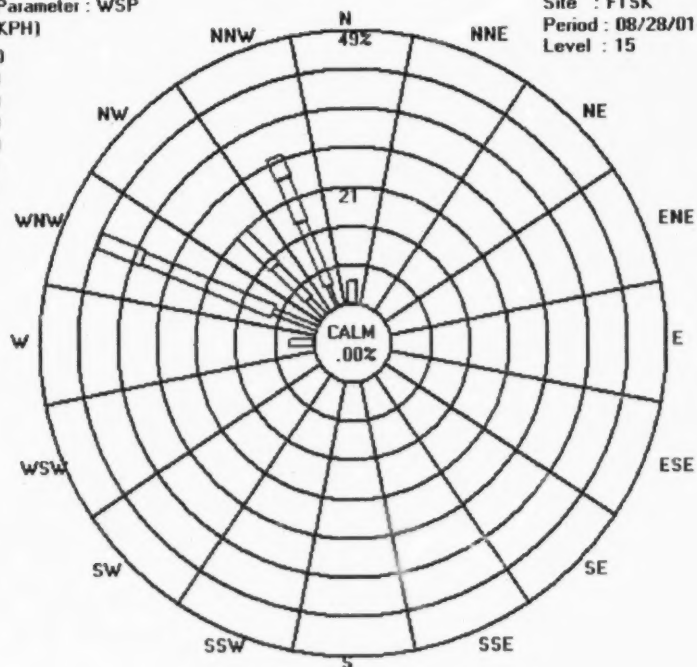
Site : FTSK
Period : 08/27/01-08/27/01
Level : 15

Figure 3: Wind Directions on August 26 and 27 at the Alberta Environment Fort Saskatchewan air quality station.

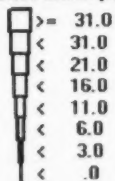
Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FTSK
Period : 08/28/01-08/28/01
Level : 15



Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FTSK
Period : 08/29/01-08/29/01
Level : 15

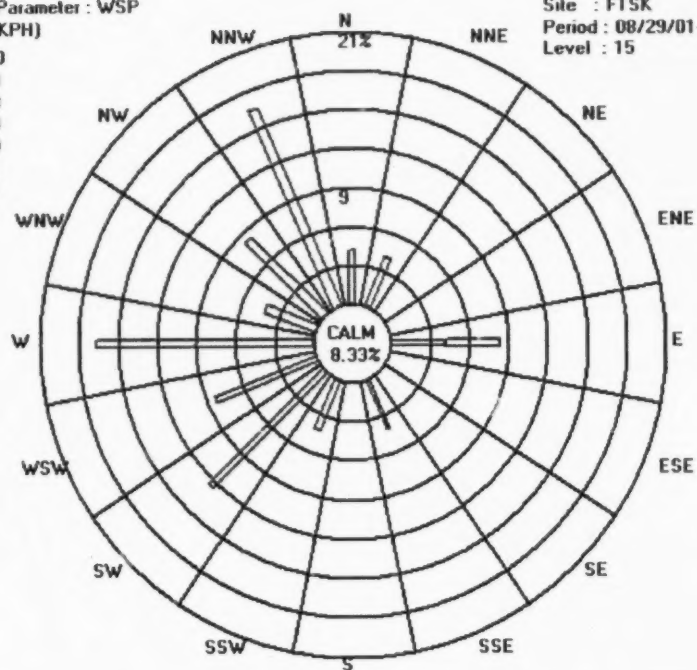
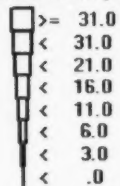
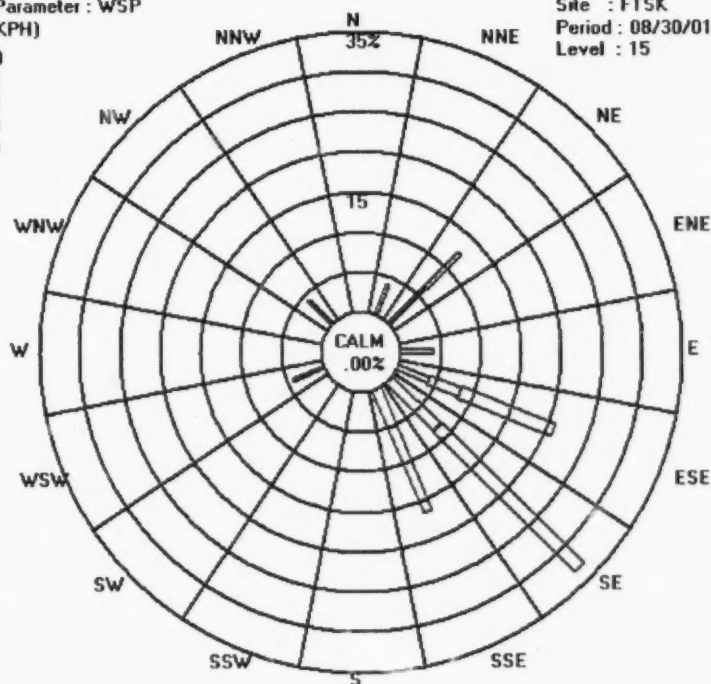


Figure 3: Wind Directions on August 28 and 29 at the Alberta Environment Fort Saskatchewan air quality station.

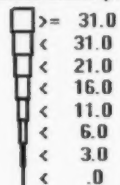
Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FTSK
Period : 08/30/01-08/30/01
Level : 15



Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FTSK
Period : 08/31/01-08/31/01
Level : 15

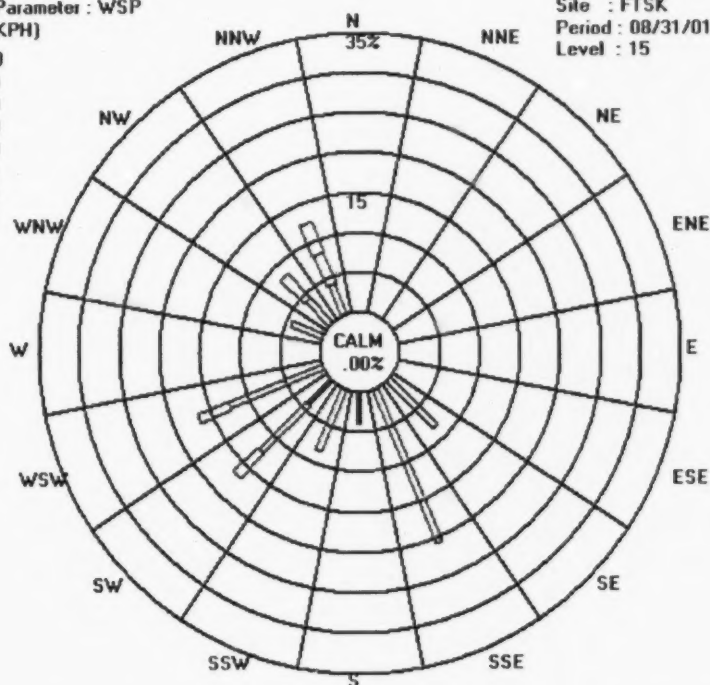
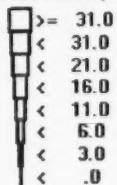
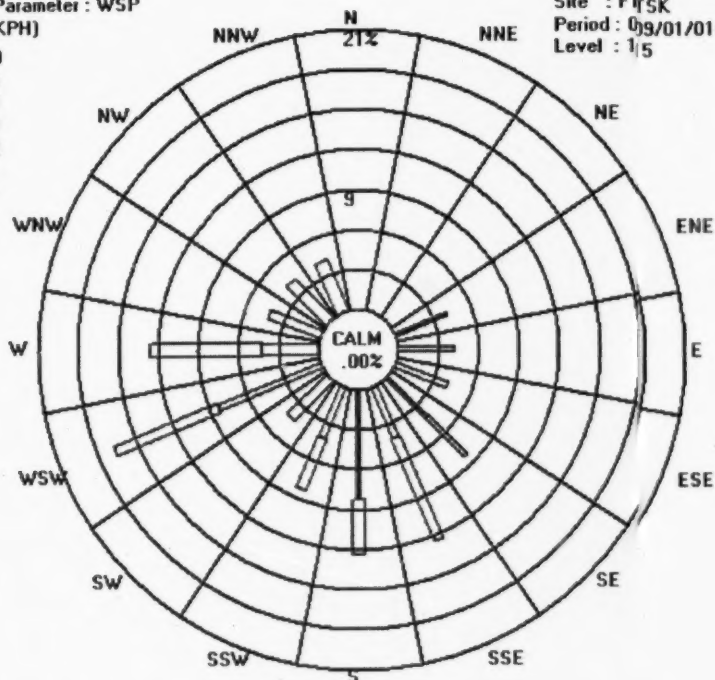


Figure 4: Wind Directions on August 30 and 31 at the Alberta Environment Fort Saskatchewan air quality station.

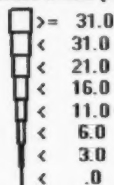
Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FT SK
Period : 09/01/01-09/01/01
Level : 1/5



Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FT SK
Period : 09/02/01-09/02/01
Level : 1/5

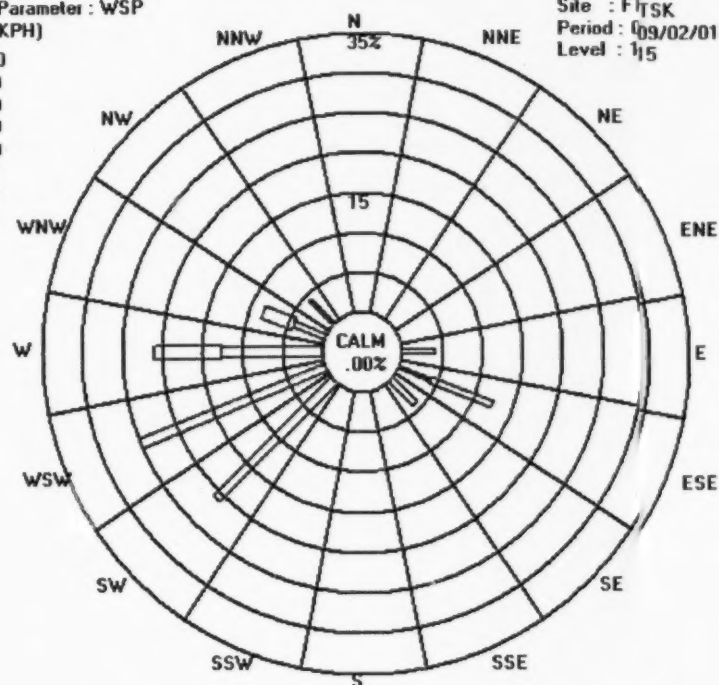
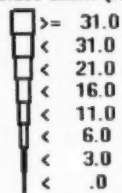


Figure 5: Wind Directions on September 1 and 2 at the Alberta Environment Fort Saskatchewan air quality station.

Logger : 14 Parameter : WSP
Class Limits (KPH)



Site : FTSK
Period : 09/03/01-09/03/01
Level : 15

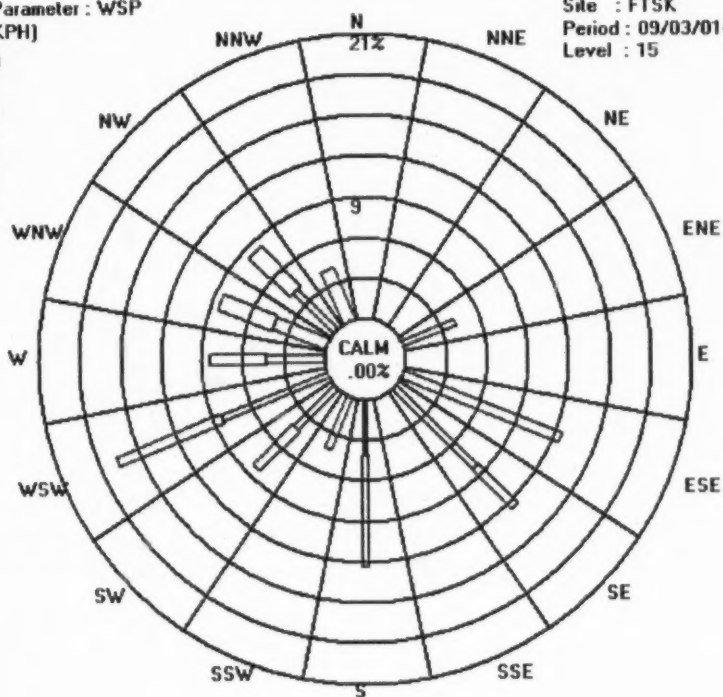


Figure 6: Wind Directions on September 3 at the Alberta Environment Fort Saskatchewan air quality station.

